

We claim:

1. A method for agglomerating particulate material comprising:
rendering the surface of the particulate material negative;
adding to the particulate material a binding effective amount of a polymeric binder; and
forming the particulate material into agglomerates.
2. The method of claim 1, wherein said polymeric binder is guar, guar derivatives, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, modified starch, starch derivatives, carboxymethyl starch, pregelatinized starch, alginates, pectins, polyacrylamides and derivatives thereof, polyacrylates and copolymers thereof, polyethyleneoxides, cellulose derivatives and salts thereof, carboxymethyl cellulose, hydroxyethyl cellulose, carboxymethylhydroxyethyl cellulose, methylhydroxyethyl cellulose, carboxymethyldihydroxypropyl cellulose, xanthan gum, dairy wastes, wood related products, lignin, or mixtures thereof.
3. The method of claim 1, wherein the step of rendering includes adding to the particulate material sodium citrate, acrylate dispersants, other salts of mono-, multi carboxylic acids, phosphates, non-ionic water soluble polymers, guar, starch, non-ionic polyacrylamides/acrylates, non-ionic celluloses, methyl/ethyl cellulose, or mixtures thereof.
4. The method of claim 1, wherein the step of rendering includes adding sodium citrate to the particulate material and the polymeric binder is an alkali metal salt of carboxymethyl cellulose.
5. The method of claim 1, wherein the particulate material is a metal containing ore.

6. The method of claim 5, wherein the metal containing ore is iron ore.
7. The method of claim 1, further comprising adding to the particulate material sodium carbonate and caustic.
8. The method of claim 7, wherein the particulate material is iron ore, the polymeric binder is sodium carboxymethyl cellulose, the binding effective amount of sodium carboxymethyl cellulose ranges from about 0.005% to about 0.2% based on the weight of iron ore ranging from about 0.1lb/ton to about 4.5 lbs/ton, the amount of sodium carbonate ranges from about 0.005% to about 0.07% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.5 lbs/ton, the amount of caustic ranges from about 0.005% to about 0.05% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.1 lb/ton, the step of rendering includes adding sodium citrate to the iron ore, and the amount of sodium citrate ranges from about 0.005% to about 0.1% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 2.2 lbs/ton.
9. A method for agglomerating particulate material comprising:
chelating interfering elements in or on the particulate material;
adding to the particulate material a binding effective amount of a polymeric binder; and
forming the particulate material into agglomerates.
10. The method of claim 9, wherein said polymeric binder is guar, guar derivatives, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, modified starch, starch derivatives, carboxymethyl starch, pregelatinized starch, alginates, pectins, polyacrylamides and derivatives thereof, polyacrylates and copolymers thereof, polyethyleneoxides, cellulose derivatives and salts thereof, carboxymethyl cellulose, hydroxyethyl cellulose, carboxymethylhydroxyethyl cellulose, methylhydroxyethyl cellulose, carboxymethyldihydroxypropyl cellulose, xanthan

gum, dairy wastes, wood related products, lignin, or mixtures thereof.

11. The method of claim 9, wherein the step of chelating includes adding to the particulate material sodium citrate, tetra-sodium EDTA, ether sequestering agents, oxalates, or mixtures thereof.

12. The method of claim 9, wherein the step of chelating includes adding sodium citrate to the particulate material and the polymeric binder is an alkali metal salt of carboxymethyl cellulose.

13. The method of claim 9, wherein the particulate material is a metal containing ore.

14. The method of claim 13, wherein the metal containing ore is iron ore.

15. The method of claim 9, further comprising adding to the particulate material sodium carbonate and caustic.

16. The method of claim 15, wherein the particulate material is iron ore, the polymeric binder is sodium carboxymethyl cellulose, the binding effective amount of sodium carboxymethyl cellulose ranges from about 0.005% to about 0.2% based on the weight of iron ore ranging from about 0.1 lb/ton to about 4.5 lbs/ton, the amount of sodium carbonate ranges from about 0.005% to about 0.07% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.5 lbs/ton, the amount of caustic ranges from about 0.005% to about 0.05% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.1 lb/ton, the step of chelating includes adding sodium citrate to the iron ore, and the amount of sodium citrate ranges from about 0.005% to about 0.1% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 2.2 lbs/ton.

17. The method of claim 9, wherein the interfering elements are sulfur, manganese, ferrous hydroxides, Ca^{2+} ions, Mg^{2+} ions or mixtures thereof.

18. A method for agglomerating iron ore comprising:
adding a binding effective amount of a polymeric binder and sodium citrate to an iron ore which is otherwise difficult or impossible to form into agglomerates of sufficient strength; and
forming the iron ore into agglomerates.

19. The method of claim 18, wherein said polymeric binder is guar, guar derivatives, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, modified starch, starch derivatives, carboxymethyl starch, pregelatinized starch, alginates, pectins, polyacrylamides and derivatives thereof, polyacrylates and copolymers thereof, polyethyleneoxides, cellulose derivatives and salts thereof, carboxymethyl cellulose, hydroxyethyl cellulose, carboxymethylhydroxyethyl cellulose, methylhydroxyethyl cellulose, carboxymethyldihydroxypropyl cellulose, xanthan gum, dairy wastes, wood related products, lignin, or mixtures thereof.

20. The method of claim 18, wherein the step of adding further includes adding sodium carbonate to the iron ore and the polymeric binder is an alkali metal salt of carboxymethyl cellulose.

21. The method of claim 20, wherein the step of adding further includes adding caustic to the iron ore.

22. The method of claim 21, wherein the polymeric binder is sodium carboxymethyl cellulose, the binding effective amount of sodium carboxymethyl cellulose ranges from about 0.005% to about 0.2% based on the weight of iron ore ranging from about 0.1lb/ton to about 4.5 lbs/ton, the amount of sodium carbonate ranges from about 0.005% to about 0.07% based on the weight of the

iron ore ranging from about 0.1 lb/ton to about 1.5 lbs/ton, the amount of caustic ranges from about 0.005% to about 0.05% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.1 lb/ton, and the amount of sodium citrate ranges from about 0.005% to about 0.1% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 2.2 lbs/ton.

23. The method of claim 18, wherein the iron ore is a hematite ore.

24. The method of claim 18, wherein the iron ore is from Venezuela, Brazil or Canada.

25. A method for agglomerating particulate material comprising:
adding to the particulate material a binding effective amount of a polymeric binder, sodium carbonate and sodium citrate; and
forming the particulate material into agglomerates.

26. The method of claim 25, wherein said polymeric binder is guar, guar derivatives, carboxymethyl guar, hydroxypropyl guar, carboxymethylhydroxypropyl guar, modified starch, starch derivatives, carboxymethyl starch, pregelatinized starch, alginates, pectins, polyacrylamides and derivatives thereof, polyacrylates and copolymers thereof, polyethylenoxides, cellulose derivatives and salts thereof, carboxymethyl cellulose, hydroxyethyl cellulose, carboxymethylhydroxyethyl cellulose, methylhydroxyethyl cellulose, carboxymethyldihydroxypropyl cellulose, xanthan gum, dairy wastes, wood related products, lignin, or mixtures thereof.

27. The method of claim 25, wherein the polymeric binder is an alkali metal salt of carboxymethyl cellulose.

28. The method of claim 25, wherein the particulate material is a metal containing ore.

29. The method of claim 28, wherein the metal containing ore is iron ore.

30. The method of claim 25, further comprising adding caustic to the particulate material.

31. The method of claim 30, wherein the particulate material is iron ore, the polymeric binder is sodium carboxymethyl cellulose, the binding effective amount of sodium carboxymethyl cellulose ranges from about 0.005% to about 0.2% based on the weight of iron ore ranging from about 0.1 lb/ton to about 4.5 lbs/ton, the amount of sodium carbonate ranges from about 0.005% to about 0.07% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.5 lbs/ton, the amount of caustic ranges from about 0.005% to about 0.05% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 1.1 lb/ton, and the amount of sodium citrate ranges from about 0.005% to about 0.1% based on the weight of the iron ore ranging from about 0.1 lb/ton to about 2.2 lbs/ton.